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L9: Entry 13 of 63 File: DWPI Apr 20, 1999

DERWENT-ACC-NO: 1999-308705
DERWENT-WEEK: 199929

TITLE: Glass cross for printed wiring board used in electric and electronic devices - has glass yarn whose longitudinal and vertical threads are arranged in specific state

PATENT-ASSIGNEE:

ASSIGNEE	CODE
ASAHI-SCHWEBEL KK	ASAH

PRIORITY-DATA: 1997JP-0287617 (October 6, 1997)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 11107112 A	April 20, 1999		007	D03D015/12

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP11107112A	October 6, 1997	1997JP-0287617	

INT-CL (IPC): B32 B 17/04; D03 D 1/00; D03 D 15/12

ABSTRACTED-PUB-NO: JP11107112A
BASIC-ABSTRACT:

NOVELTY - The glass cross of plain weave structure is formed by glass yarn. The longitudinal and vertical threads of the glass yarn are arranged at specific state. The bulk density (C) of glass cross is 43.5% or more.

DETAILED DESCRIPTION - The distance between longitudinal and vertical threads is set as 0.7-1.3 and calculated as (CT/CY)/(DT/DY) where CT is weave density of longitudinal thread, CY is weave density of vertical thread, DT is crimp percentage of longitudinal thread, DY is crimp percentage of vertical thread.

USE - For printed wiring board (PWB) used in electric and electronic device.

ADVANTAGE - Reduces variation of dimension and molding time dispersion of PWB. Avoids the need for a scale factor even when circuit pattern is of high density. Enables accurate positioning of component in standard hole.

DESCRIPTION OF DRAWING(S) - The figure shows model diagram showing space of threads of glass cross.

CHOSEN-DRAWING: Dwg.1/1

TITLE-TERMS: GLASS CROSS PRINT WIRE BOARD ELECTRIC ELECTRONIC DEVICE GLASS YARN LONGITUDE VERTICAL THREAD ARRANGE SPECIFIC STATE

DERWENT-CLASS: A85 F03 L01 L03 P73 V04

CPI-CODES: A12-E07A; F01-D09B; F03-D; F04-E; L01-F03D; L01-L04; L03-H04E5;

EPI-CODES: V04-R07P;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 018 ; P0000 Polymer Index [1.2] 018 ; ND01 ; Q9999 Q7454 Q7330

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1999-091502
Non-CPI Secondary Accession Numbers: N1999-231411

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to improvement of the glass fabrics used as a base material of the printed-circuit board used in the electrical and electric equipment and an electronic field.
[0002]
[Description of the Prior Art] Although a printed-circuit board is made by the well-known processing method for giving drill punching, hole washing, non-electrolytic-copper plating, etc. to a copper-clad laminate, generally it is known that the size of a copper-clad laminate will change into these processing processes. A laminating and the glass fabrics used for this although fabricated and manufactured are JIS by the press machine about the prepreg to which the copper-clad laminate used here sank thermosetting resin, such as an epoxy resin, into glass fabrics. Generally what is shown in R3414 is used.
[0003] Moreover, although the glass fabrics used are chosen towards reducing a dimensional change, a warp, torsion, etc. of a laminate in consideration of the composition of a laminate etc., in the glass fabrics specified to JIS, it does not become fundamental solution but glass fabrics of new composition are desired. The interval of the next doors of the glass yarn which constitutes glass fabrics For example, a latus sake, A lot of resins are distributed over the crevice between thread and thread in a prepreg, and dispersion in hardening contraction of a resin exists, since [moreover,] the interval of thread and thread is large -- thread -- moving -- easy -- a bird clapper -- or the textile of the length direction and the width direction -- dispersion in the dimensional change of the laminate resulting from the badness of the balance by the difference in density etc. -- the problem of the anisotropy (the following, anisotropy) of the length direction and the width direction has arisen further
[0004] Like recently, when a circuit pattern becomes high-density, advanced technology is needed for the amendment work of a scale factor required at the time of negative creation of a circuit pattern, and a through hole ****** process, and when especially the work size of a printed-circuit board is large, many part positioning marks are needed. On the other hand, although the proposal of the glass fabrics which give physical processing of opening processing etc. to the glass fabrics specified to JIS, and open a thread and which tried and only made the same weave density of the length direction and the width direction etc. is made, neither is enough and has not resulted in the solution in question.
[0005]
[Problem(s) to be Solved by the Invention] the glass fabrics which make it possible for this invention not to need advanced technology for the amendment work of a scale factor, especially to make small dispersion in the dimensional change of the substrate which creates a printed-circuit board from a copper-clad laminate in order to be able to perform automatic insertion of parts easily by the few part positioning mark, and which comes out in process, and to make the anisotropy of the length direction and the width direction small are offered -- it is in things
[0006]
[Means for Solving the Problem] this invention person is the organization of the plain weave glass fabrics for laminates, as a result of examining many things about the above-mentioned technical problem. (b) Interval of glass yarn (b) Relation between the weave density of length thread or width thread, and a crimp percentage (c) By setting bulk density as a certain specific range, it is small in dispersion in the dimensional change of the substrate in the inside of a manufacturing process, and finds out that the anisotropy of length thread and width thread can be made small, and came to complete this invention. Namely, this invention is set to the glass fabrics of a plain-weave organization which it comes to weave from the glass yarn either :** length thread or width thread and whose both are thread 45tex or less. (a) The length direction and the width direction by less than 30% of **** of the glass yarn which constitutes glass fabrics, and the glass yarn in which the interval of glass yarn forms a crevice the textile of (b) length thread -- the textile of density (CT) and width thread -- following formula (1): which **(ed) the ratio of density (CY) by the ratio of the crimp percentage (DT) of length thread, and the crimp percentage (DY) of width thread -- [Equation 2]

$$\frac{(CT/CY)}{(DT/DY)} \quad \cdots (1)$$

It is the glass fabrics which come out and have the value expressed in the range of 0.7-1.3, and is (c) further. The glass fabrics whose bulk density of these glass fabrics is 43.5% or more are offered. moreover (however, the distance x indicated to be the interval of the thread said here and thread to drawing 1 is shown.) --
[0007] ** Glass yarn is JIS. Name E225 of the thread specified to be R3413 1/0 and E225 It has the feature also at the point

which is the thread which has the yarn count equivalent to 1/0 of thread. Moreover, the crimp percentage (DT) of ** length thread has the feature also at a larger point than the crimp percentage (DY) of width thread. moreover, the textile of ** length thread -- density (CT) -- 65-71 per 25mm of unit lengths -- it is -- the textile of width thread -- it has the feature also at the point that density (CY) is 53 - 65 per 25mm of unit lengths moreover, the textile of ** length thread -- density (CT) -- 69-**2 per 25mm of unit lengths -- it is -- the textile of width thread -- it has the feature also at the point that density (CY) is 55 **two per 25mm of unit lengths Moreover, it has the feature also at the point that opening processing is given to ** glass fabrics. An effect can be clarified thereby more easily.

[0008] Hereafter, this invention is explained in detail. The yarn count here is JIS. As shown in R3413, the mass of the glass yarn per unit length is expressed. Moreover, a crimp percentage is JIS. According to the crimp-percentage measuring method of a publication, it measured to L1096. Moreover, the bulk density of a cross shows the value of [the density (2.6 g/cm3) of the cloth weight (g/m2) / glass of a cross] / (thickness (mm) x1000 of a cross) x100. being mentioned here -- being equivalent -- that the yarn count is equivalent or similar thread -- being shown -- E232 [for example,] 1/0 and D225 1/0 etc. -- thread is pointed out

[0009] By using the specific glass fabrics of this invention, it sets to the laminate using these glass fabrics, and is (i). It becomes possible to reduce the amount of the resin which exists in the crevice between glass yarn, and-izing of the foldout number of (ii) glass yarn and the balance of a crimp percentage can be carried out [**] (iii). Dispersion in the dimensional change of this laminate was mitigated, and it found out that especially an anisotropy improved remarkably, and resulted in this invention.

[0010] Usually, the dimensional change of a laminate is governed by how the glass fabrics which are base materials suppress volume changes, such as hardening contraction of a matrix resin, and it depends for dispersion in a dimensional change on an uneven distribution of the resin in a laminate. For example, in a glass-fabrics flat surface, although it is most desirable that the whole is covered by glass yarn, it is desirable for a uniform distribution of a resin that whole the area covered by glass yarn at least is 96% or more preferably 95% or more. For that purpose, although the crevice between glass yarn has a more desirable thing narrow as much as possible, it is required to be [of **** of the glass yarn which constitutes this crevice at least] less than 25% preferably less than 30%, and it is desirable for maximum to be less than 30% more preferably (claim 1-(a)). Specifically, it is E225. 1/0 When average **** of thread is 300 micrometers, it is needed that this crevice is less than 90 micrometers.

[0011] The glass yarn used for this invention is the yarn count of the thread of specification [the yarn count], E225 [i.e.,]. 1/0 and E225 It is desirable in order to acquire a cross with a thickness of 0.1mm for which to have the yarn count equivalent to 1/0 of thread is needed on laminate composition (claim 2). Embedding of the glass fabrics is carried out to the epoxy resin of room temperature setting etc., and measurement of the crevice between glass-yarn width of face and thread grinds them, begins to delete a glass-yarn cross section, with an electron microscope, an optical microscope, etc., measures the length between observation, ****, and thread, and is obtained.

[0012] Moreover, although it depends for the anisotropy on the amount of the glass yarn of the length direction and the width direction greatly, it is dependent also on the size of the reinforcement effect to the direction of a flat surface of the glass yarn of each direction. In order to mitigate an anisotropy, are necessary to **-ize the relation of the crimp percentage of weave density and thread. the textile of length thread -- the textile of density (CT) and width thread -- the value expressed with the following formula (1) which **(ed) the ratio of density (CY) by the ratio of the crimp percentage (DT) of length thread and the crimp percentage (DY) of width thread is in the range of 0.7-1.3 -- It is effective in order for it to be anisotropy improvement that it is in the range of 0.8-1.2 preferably (claim 1-(b)).

[Equation 3]

$$\frac{(CT/CY)}{(DT/DY)} \quad \cdots (1)$$

If the reinforcement effect of the width direction becomes large less than by 0.7 and the value of the above-mentioned formula (1) exceeds 1.3, the reinforcement effect of the length direction will become large and the balance of the reinforcement effect of length and width will become bad.

[0013] Moreover, in case thermosetting resin, such as an epoxy resin, is infiltrated into glass fabrics and a prepreg is generally created, tension is applied in the length direction and a cross serves as a form developed in the length direction. However, beforehand, when the crimp percentage of the direction of length thread uses large glass fabrics from the crimp percentage of width thread, even if it changes this crimp percentage somewhat at the time of prepreg creation, the balance of the reinforcement effect of length and width works in the direction held, and it is desirable to dimensional-change behavior (claim 3).

[0014] (Moreover, the glass yarn used for this invention, i.e., E225, 1/0 and E225 The glass yarn which has the yarn count equivalent to 1/0 of thread is used.) Although the weave density of length thread has desirable 65-71 / 25mm in order to make the crimp percentage of length thread larger than the crimp percentage of width thread, in order to attain ** [according to / the weave density of width thread], it is more desirable that they are / 69 / **2 / 25mm. If 71 / 25mm are exceeded, thread will come to rub, problems, such as a fluff, occur, and it is not desirable on quality. Furthermore, although the weave density of width thread has desirable 53-65 / 25mm from the balance of the reinforcement effect, if the weave density of width thread increases, since the productivity of textiles will fall and a fluff etc. will occur further, 55 **2 / 25mm are more desirable (claims 4 and 5).

[0015] Moreover, it is expected that the reinforcement effect of a base material becomes large by making the amount of glass increase by thickness regularity, when the umbrella density of glass fabrics is 43.5% or more experimentally, especially at 44% or more, the absolute value of the rate of a dimensional change is notably small, and the bird clapper is checked (claim-(c)). In this case, although it is better as the umbrella density of glass fabrics is large because of the purpose which makes a dimensional

change small, there is a relation of crevice formation of the glass yarn which constitutes glass fabrics, and 70% is enough as the upper limit.

[0016] Furthermore, by giving opening processing by the high frequency oscillation in the inside of solvents, such as opening processing, for example, opening by the pressure of a pillar-shaped stream, and water, etc., thickness decreases, and umbrella density increases and the glass fabrics of this invention will be in a more desirable state (claim 6). Although the glass usually called E glass (alkali free glass) is used for the glass fabrics of the laminate used for a printed wired board, even if it uses D glass, S glass, high dielectric glass, etc., the effect of this invention is not spoiled with a glass kind.

[0017] A laminating is carried out combining the resin sinking-in prepreg which a matrix resin like an epoxy resin is infiltrated into the glass fabrics of this invention, and makes a resin sinking-in prepreg that what is necessary is just to follow a conventional method, the number of is one, carries out two or more sheet laminating of this, or consists of the usual glass fabrics in order to create the laminate of this invention, and it is obtained by carrying out heating pressing. Moreover, when using glass fabrics, a nonwoven fabric, etc. together as a base material, the purpose of this invention can be attained by using the glass fabrics of this invention for a surface. Moreover, even when using the glass fabrics of this invention as an adhesion prepreg for multilayer board molding, reduction of dispersion in a dimensional change, improvement in an anisotropy, etc. can attain an improvement of dimensional-change behavior.

[0018] As a resin used for a laminate, thermoplastics, such as thermosetting resin, such as an epoxy resin, an unsaturated polyester resin, polyamide resin, BT resin, and a cyanate resin, and a PPO resin, polyetherimide resin, a fluorine resin, or those mixed resins are mentioned. Moreover, you may use into a resin the resin with which inorganic bulking agents, such as an aluminum hydroxide, were mixed.

[0019]

[Example] Hereafter, although an example explains this invention in detail, this invention is not limited to these. The laminate in an example was created by the following methods, and the dimensional change was measured according to JIS6481. A measurement result is shown in Table 2.

: (The creation method of a laminate) To the glass fabrics of this invention, it sank in, the epoxy resin was dried, and the prepreg was obtained. The one-sheet laminating of this prepreg is carried out, and it is 35-micrometer copper foil in piles further up and down 175 degrees C and 40 kg/cm2 Heating pressurization was carried out and the laminate was obtained.

[0020] (An example and example of comparison) It is ECE225 to length thread. 1/0 It is used and is ECE225 to width thread. 1/0 was used and weaving was carried out by the textile composition shown in Table 1 using the air-jet loom in the plain-weave organization. Opening processing gave filamentation by the water pressure of a pillar-shaped stream. The result of Table 2 showed that the dimensional-change behavior, the anisotropy, and dispersion of a laminate were improved sharply, when the glass fabrics of this invention were used.

[0021]

[Table 1]

評価ガラスクロス諸物性

			比較例1	比較例2	比較例3	実施例1	実施例2	実施例3	実施例4	実施例5	比較例6
			NO1	NO2	NO3	NO4	NO4 開繊加工品	NO5 開繊加工品	NO6	NO7	NO8
織り密度 (本／25mm)		CT タテ	60	65	69	69	69	69	69	69	69
		CY ヨコ	58	55	51	55	55	60	62	64	68
厚み (mm)			0.095	0.097	0.103	0.096	0.095	0.101	0.103	0.102	0.110
布重量 (g／m²)			105.4	108.0	107.4	111.3	111.2	115.8	116.9	118.4	120.4
かさ密度 (%)			42.7	42.8	40.1	44.6	45.0	44.1	43.7	44.6	42.1
断面観察 μm	タテ	糸幅	273	292	291	322	325	305	317	306	310
		糸厚み	53	53	52	50	49	51	50	50	51
		糸糸間隔	103	64	41	35	33	30	20	26	26
	ヨコ	糸幅	325	317	312	307	308	305	298	301	299
		糸厚み	49	51	52	52	51	55	53	53	55
		糸糸間隔	85	51	149	90	87	80	74	61	60
	糸糸間隔/糸幅	タテ	38	22	14	11	10	10	6	8	8
	(%)	ヨコ	20	16	48	29	28	26	25	20	20
織縮み率 (%)		DT タテ	0.50	0.80	0.87	0.98	0.97	1.10	1.08	1.00	0.94
		DY ヨコ	0.97	0.91	0.41	0.65	0.68	0.91	0.84	0.98	1.12
(CT/CY)/(DT/DY)			2.00	1.94	0.64	0.83	0.88	0.95	0.87	1.06	1.21

[0022]
[Table 2]

寸法変化率測定結果　　（単位：%）

		エッチング					加熱			
		最大値	最小値	バラツキ	平均値		最大値	最小値	バラツキ	平均値
NO1	タテ	0.065	-0.015	0.020	-0.008	タテ	-0.068	-0.083	0.015	-0.072
	ヨコ	0.021	-0.005	0.026	0.010	ヨコ	-0.025	-0.048	0.023	-0.035
NO2	タテ	0.040	-0.032	0.032	-0.020	タテ	-0.042	-0.065	0.023	-0.054
	ヨコ	-0.008	-0.028	0.020	-0.010	ヨコ	-0.020	-0.046	0.026	-0.032
NO3	タテ	-0.015	-0.040	0.025	-0.030	タテ	-0.055	-0.075	0.020	-0.062
	ヨコ	-0.010	-0.022	0.012	-0.015	ヨコ	-0.024	-0.040	0.016	-0.032
NO4	タテ	0.002	-0.002	0.004	0.001	タテ	-0.025	-0.035	0.010	-0.028
	ヨコ	0.000	-0.009	0.009	-0.005	ヨコ	-0.015	-0.022	0.007	-0.020
NO4 [illegible]	タテ	0.005	-0.004	0.009	0.003	タテ	-0.026	-0.035	0.009	-0.027
	ヨコ	0.003	-0.009	0.012	-0.006	ヨコ	-0.011	-0.024	0.013	-0.020
NO5 [illegible]	タテ	-0.020	-0.028	0.008	-0.025	タテ	-0.020	-0.033	0.013	-0.029
	ヨコ	-0.007	-0.017	0.010	-0.012	ヨコ	-0.015	-0.024	0.009	-0.022
NO6	タテ	-0.010	-0.021	0.011	-0.015	タテ	-0.029	-0.036	0.008	-0.032
	ヨコ	-0.002	-0.018	0.016	-0.010	ヨコ	-0.017	-0.024	0.007	-0.020
NO7	タテ	0.001	-0.002	0.003	0.000	タテ	-0.025	-0.034	0.009	-0.030
	ヨコ	0.000	-0.010	0.010	-0.008	ヨコ	-0.010	-0.018	0.008	-0.015
NO8	タテ	0.030	-0.002	0.032	0.020	タテ	-0.033	-0.057	0.024	-0.045
	ヨコ	-0.001	-0.032	0.031	-0.021	ヨコ	-0.010	-0.030	0.020	-0.025

＊バラツキは（最大値－最小値）の絶対値を示す。

[0023]
[Effect of the Invention] The laminate for printed wired boards using the glass fabrics of this invention is small **, and even when a circuit pattern is high-density, positioning of parts of it is attained small from the thing of the former [anisotropy / the] by the dimensional change at the time of fabrication, and its dispersion by ****** and the part positioning mark in an amendment of a scale factor only in a criteria hole.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] In the glass fabrics of a plain-weave organization which it comes to weave from the glass yarn either length thread or width thread and whose both are thread 45tex or less (a) The length direction and the width direction by less than 30% of **** of the glass yarn which constitutes glass fabrics, and the glass yarn in which the interval of glass yarn forms a crevice the textile of (b) length thread -- the textile of density (CT) and width thread -- following formula (1): which **(ed) the ratio of density (CY) by the ratio of the crimp percentage (DT) of length thread, and the crimp percentage (DY) of width thread -- [Equation 1]

$$\frac{(CT/CY)}{(DT/DY)} \quad \cdots (1)$$

It is the glass fabrics which come out and have the value expressed in the range of 0.7-1.3, and is (c) further. Glass fabrics characterized by the bulk density of these glass fabrics being 43.5% or more. (However, the distance x indicated to be the interval of the thread said here and thread to drawing 1 is shown.)
[Claim 2] Glass yarn is JIS. Name E225 of the thread specified to be R3413 1/0 and E225 Glass fabrics according to claim 1 characterized by being the thread which has the yarn count equivalent to 1/0 of thread.
[Claim 3] Glass fabrics according to claim 1 or 2 to which the crimp percentage (DT) of length thread is characterized by being larger than the crimp percentage (DY) of width thread.
[Claim 4] the textile of length thread -- density (CT) -- 65-71 per 25mm of unit lengths -- it is -- the textile of width thread -- the glass fabrics according to claim 1 to 3 characterized by density (CY) being 53 - 65 per 25mm of unit lengths
[Claim 5] the textile of length thread -- density (CT) -- 69-**2 per 25mm of unit lengths -- it is -- the textile of width thread -- the glass fabrics according to claim 4 characterized by density (CY) being 55 **two per 25mm of unit lengths
[Claim 6] Glass fabrics according to claim 1 to 5 characterized by giving opening processing to glass fabrics.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to improvement of the glass fabrics used as a base material of the printed-circuit board used in the electrical and electric equipment and an electronic field.

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PRIOR ART

[Description of the Prior Art] Although a printed-circuit board is made by the well-known processing method for giving drill punching, hole washing, non-electrolytic-copper plating, etc. to a copper-clad laminate, generally it is known that the size of a copper-clad laminate will change into these processing processes. A laminating and the glass fabrics used for this although fabricated and manufactured are JIS by the press machine about the prepreg to which the copper-clad laminate used here sank thermosetting resin, such as an epoxy resin, into glass fabrics. Generally what is shown in R3414 is used.

[0003] Moreover, although the glass fabrics used are chosen towards reducing a dimensional change, a warp, torsion, etc. of a laminate in consideration of the composition of a laminate etc., in the glass fabrics specified to JIS, it does not become fundamental solution but glass fabrics of new composition are desired. For example, since the interval of the next doors of the glass yarn which constitutes glass fabrics is large, a lot of resins are distributed over the crevice between thread and thread in a prepreg. since the interval of that dispersion in hardening contraction of a resin exists, and thread and thread is large -- thread -- moving -- easy -- a bird clapper -- or the textile of the length direction and the width direction -- dispersion in the dimensional change of the laminate resulting from the badness of the balance by the difference in density etc. -- the problem of the anisotropy (the following, anisotropy) of the length direction and the width direction has arisen further

[0004] Like recently, when a circuit pattern becomes high-density, advanced technology is needed for the amendment work of a scale factor required at the time of negative creation of a circuit pattern, and a through hole ****** process, and when especially the work size of a printed-circuit board is large, many part positioning marks are needed. On the other hand, although the proposal of the glass fabrics which give physical processing of opening processing etc. to the glass fabrics specified to JIS, and open a thread and which tried and only made the same weave density of the length direction and the width direction etc. is made, neither is enough and has not resulted in the solution in question.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] the glass fabrics which make it possible for this invention not to need advanced technology for the amendment work of a scale factor, especially to make small dispersion in the dimensional change of the substrate which creates a printed-circuit board from a copper-clad laminate in order to be able to perform automatic insertion of parts easily by the few part positioning mark, and which comes out in process, and to make the anisotropy of the length direction and the width direction small are offered -- it is in things

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EXAMPLE

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[0020] (An example and example of comparison) It is ECE225 to length thread. 1/0 It is used and is ECE225 to width thread. 1/0 was used and weaving was carried out by the textile composition shown in Table 1 using the air-jet loom in the plain-weave organization. Opening processing gave filamentation by the water pressure of a pillar-shaped stream. The result of Table 2 showed that the dimensional-change behavior, the anisotropy, and dispersion of a laminate were improved sharply, when the glass fabrics of this invention were used.
[0021]
[Table 1]

評価ガラスクロス諸物性

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			NO1	NO2	NO3	NO4	NO4 開繊加工品	NO5 開繊加工品	NO6	NO7	NO8
織り密度 (本／25mm)		CT タテ	60	65	69	69	69	69	69	69	69
		CY ヨコ	58	55	51	55	55	60	62	64	68
厚み (mm)			0.095	0.097	0.103	0.096	0.095	0.101	0.103	0.102	0.110
布重量 (g／m²)			105.4	108.0	107.4	111.3	111.2	115.8	116.9	118.4	120.4
かさ密度 (%)			42.7	42.8	40.1	44.6	45.0	44.1	43.7	44.8	42.1
断面観察 μm	タテ	糸幅	273	292	291	322	325	305	317	306	310
		糸厚み	53	53	52	50	49	51	50	50	51
		糸糸間隔	103	64	41	35	33	30	20	26	26
	ヨコ	糸幅	325	317	312	307	308	305	298	301	299
		糸厚み	49	51	52	52	51	55	53	53	55
		糸糸間隔	85	51	149	90	87	80	74	61	60
糸糸間隔/糸幅 (%)		タテ	38	22	14	11	10	10	6	8	8
		ヨコ	20	16	48	29	28	26	25	20	20
織込み率 (%)		DT タテ	0.50	0.80	0.87	0.98	0.97	1.10	1.08	1.00	0.94
		DY ヨコ	0.97	0.91	0.41	0.65	0.68	0.91	0.84	0.98	1.12
(CT/CY)/(DT/DY)			2.00	1.94	0.64	0.83	0.88	0.95	0.87	1.06	1.21

[0022]
[Table 2]

寸法変化率測定結果　　（単位：%）

	エッチング					加熱				
		最大値	最小値	バラツキ	平均値		最大値	最小値	バラツキ	平均値
NO1	タテ	0.065	-0.015	0.020	-0.008	タテ	-0.058	-0.083	0.015	-0.072
	ヨコ	0.021	-0.005	0.026	0.010	ヨコ	-0.025	-0.048	0.023	-0.035
NO2	タテ	0.040	-0.032	0.032	-0.020	タテ	-0.042	-0.065	0.023	-0.054
	ヨコ	-0.008	-0.028	0.020	-0.010	ヨコ	-0.020	-0.046	0.026	-0.032
NO3	タテ	-0.015	-0.040	0.025	-0.030	タテ	-0.055	-0.075	0.020	-0.062
	ヨコ	-0.010	-0.022	0.012	-0.015	ヨコ	-0.024	-0.040	0.016	-0.032
NO4	タテ	0.002	-0.002	0.004	0.001	タテ	-0.025	-0.035	0.010	-0.028
	ヨコ	0.000	-0.009	0.009	-0.005	ヨコ	-0.015	-0.022	0.007	-0.020
NO4	タテ	0.005	-0.004	0.009	0.003	タテ	-0.026	-0.035	0.009	-0.027
研磨加工品	ヨコ	0.003	-0.009	0.012	-0.006	ヨコ	-0.011	-0.024	0.013	-0.020
NO5	タテ	-0.020	-0.028	0.008	-0.025	タテ	-0.020	-0.033	0.013	-0.029
研磨加工品	ヨコ	-0.007	-0.017	0.010	-0.012	ヨコ	-0.015	-0.024	0.009	-0.022
NO6	タテ	-0.010	-0.021	0.011	-0.015	タテ	-0.029	-0.036	0.008	-0.032
	ヨコ	-0.002	-0.018	0.016	-0.010	ヨコ	-0.017	-0.024	0.007	-0.020
NO7	タテ	0.001	-0.002	0.003	0.000	タテ	-0.025	-0.034	0.009	-0.030
	ヨコ	0.000	-0.010	0.010	-0.008	ヨコ	-0.010	-0.018	0.008	-0.015
NO8	タテ	0.030	-0.002	0.032	0.020	タテ	-0.033	-0.057	0.024	-0.045
	ヨコ	-0.001	-0.032	0.031	-0.021	ヨコ	-0.010	-0.030	0.020	-0.025

＊バラツキは（最大値－最小値）の絶対値を示す。

[Translation done.]

WEST Search History

DATE: Monday, October 21, 2002

Set Name side by side	Query	Hit Count	Set Name result set
DB=DWPI; PLUR=YES; OP=ADJ			
L9	l7 and l8	63	L9
L8	glass or fiberglass or fibreglass	340036	L8
L7	wire and (mesh or scrim or weave or woven) and circuit	443	L7
DB=USPT; PLUR=YES; OP=ADJ			
L6	4848639.pn.	1	L6
DB=DWPI; PLUR=YES; OP=ADJ			
L5	1222950	6	L5
DB=USPT; PLUR=YES; OP=ADJ			
L4	5940687.pn.	1	L4
DB=DWPI; PLUR=YES; OP=ADJ			
L3	l1 and l2	43	L3
L2	bond$	334053	L2
L1	wire and (mesh or scrim or weave or woven) and circuit	443	L1

END OF SEARCH HISTORY